



| charge in cfs |           |             | Zinc Concentration Coefficients |                |           |                  |
|---------------|-----------|-------------|---------------------------------|----------------|-----------|------------------|
|               | Intercept | coefficient |                                 | B              | Intercept |                  |
| Runoff        |           |             | Low Flow November-March         |                |           |                  |
| M34           | -2.771    | 0.394       | -2.28954                        | <u>0.38718</u> | A72       | 0.009 222.84320  |
| CC48          | 1.752     | 0.130       | 6.77165                         | <u>0.10539</u> | M34       | 0.022 175.16017  |
| A68           | -11.131   | 0.498       | -3.62869                        | <u>0.45153</u> | CC48      | 0.001 -229.17992 |
|               |           |             |                                 |                | A68       | 0.025 415.52679  |

Discharge Relationships among the three gages

| MONTH        | J  | F  | M  | A   | M   | J    | J   |
|--------------|----|----|----|-----|-----|------|-----|
| Intercept    | 1  | 1  | 1  | 1   | 1   | 1    | 1   |
| A 72         | 64 | 63 | 77 | 155 | 682 | 1196 | 624 |
| M34          | 22 | 22 | 28 | 58  | 266 | 468  | 243 |
| CC48         | 14 | 13 | 15 | 22  | 91  | 158  | 83  |
| A68          | 25 | 25 | 31 | 66  | 329 | 585  | 300 |
| Ground water | 3  | 3  | 3  | 9   | -3  | -14  | -2  |

1/(1+BQ) Discharge Representation

|      |        |        |        |        |        |        |        |
|------|--------|--------|--------|--------|--------|--------|--------|
| A 72 | 0.6345 | 0.6382 | 0.5907 | 0.4175 | 0.1401 | 0.0850 | 0.1511 |
| M34  | 0.6690 | 0.6728 | 0.6229 | 0.4383 | 0.1461 | 0.0885 | 0.1576 |
| CC48 | 0.9867 | 0.9868 | 0.9853 | 0.9785 | 0.9169 | 0.8638 | 0.9233 |
| A68  | 0.6128 | 0.6171 | 0.5623 | 0.3771 | 0.1085 | 0.0640 | 0.1178 |

Date variables

|         |        |        |         |         |         |         |         |
|---------|--------|--------|---------|---------|---------|---------|---------|
| sin     | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  | -0.1441 |
| cos     | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 | -0.9896 |
| sin1    | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 | 0.2852  |
| cos1    | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  | 0.9585  |
| Consent | 1      | 1      | 1       | 1       | 1       | 1       | 1       |

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| A72 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.6345 | 0.6382 | 0.5907  | 0.4175  | 0.1401  | 0.0850  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   |        |        |         |         |         |         |

**A72 Concentration** **685** **786** **820** **701** **434** **284** **241**

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| M34 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.6690 | 0.6728 | 0.6229  | 0.4383  | 0.1461  | 0.0885  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   | 1.0000 | 1.0000 | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

M34 Concentration **418** **464** **491** **414** **220** **93** **54**

|                      |           |            |            |            |            |            |            |            |
|----------------------|-----------|------------|------------|------------|------------|------------|------------|------------|
| CC 48                | Intercept | 1          | 1          | 1          | 1          | 1          | 1          | 1          |
|                      | BQ        | 0.9867     | 0.9868     | 0.9853     | 0.9785     | 0.9169     | 0.8638     | 0.9233     |
|                      | sin       | 0.1552     | 0.6358     | 0.9276     | 0.9887     | 0.7862     | 0.3629     | -0.1441    |
|                      | cos       | 0.9879     | 0.7719     | 0.3737     | -0.1496    | -0.6180    | -0.9318    | -0.9896    |
|                      | sin1      | 0.3066     | 0.9815     | 0.6932     | -0.2959    | -0.9717    | -0.6763    | 0.2852     |
|                      | cos1      | 0.9518     | 0.1916     | -0.7207    | -0.9552    | -0.2361    | 0.7366     | 0.9585     |
|                      | Consent   | 1.0000     | 1.0000     | 1.0000     | 1.0000     | 1.0000     | 1.0000     | 1.0000     |
| CC 48 Concentratrion |           | <b>649</b> | <b>701</b> | <b>803</b> | <b>874</b> | <b>781</b> | <b>619</b> | <b>605</b> |

|     |           |        |        |         |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|---------|
| A68 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       | 1       |
|     | BQ        | 0.6128 | 0.6171 | 0.5623  | 0.3771  | 0.1085  | 0.0640  | 0.1178  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  | -0.1441 |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 | -0.9896 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 | 0.2852  |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  | 0.9585  |
|     | Consent   |        |        |         |         |         |         |         |

|                          |            |            |             |             |            |            |            |
|--------------------------|------------|------------|-------------|-------------|------------|------------|------------|
| <b>A68 Concentration</b> | <b>666</b> | <b>910</b> | <b>1085</b> | <b>1026</b> | <b>710</b> | <b>412</b> | <b>258</b> |
|--------------------------|------------|------------|-------------|-------------|------------|------------|------------|

|               |     |     |     |     |     |     |     |
|---------------|-----|-----|-----|-----|-----|-----|-----|
| Concentration | 542 | 687 | 788 | 720 | 465 | 252 | 156 |
|---------------|-----|-----|-----|-----|-----|-----|-----|

Load in pounds per day

|              |       |       |       |      |      |      |       |
|--------------|-------|-------|-------|------|------|------|-------|
| Sum          | 197   | 238   | 335   | 634  | 1950 | 2043 | 758   |
| A72          | 237   | 268   | 341   | 586  | 1598 | 1831 | 810   |
| % Difference | -0.17 | -0.11 | -0.02 | 0.08 | 0.22 | 0.12 | -0.06 |
| RPD          | -0.18 | -0.12 | -0.02 | 0.08 | 0.20 | 0.11 | -0.07 |

Zinc Concentration Coefficients

| BQ         | sin       | cos       | sin1      | cos1              | Consent           |
|------------|-----------|-----------|-----------|-------------------|-------------------|
| 695.65917  | 159.48593 | 30.39495  | 1.74130   | <u>-36.41363</u>  |                   |
| 461.94290  | 70.35911  | 54.04852  | -21.67507 | -48.42063         | <u>-77.45726</u>  |
| 1183.29451 | 48.05030  | -23.12342 | -46.89133 | -73.58395         | <u>-189.98560</u> |
| 506.52014  | 287.74245 | 35.84487  | -1.06505  | <u>-146.36276</u> |                   |

| A   | S   | O   | N  | D  |
|-----|-----|-----|----|----|
| 1   | 1   | 1   | 1  | 1  |
| 268 | 187 | 142 | 92 | 70 |
| 103 | 71  | 53  | 33 | 25 |
| 37  | 26  | 20  | 16 | 14 |
| 122 | 82  | 60  | 38 | 28 |
| 6   | 8   | 9   | 4  | 3  |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.2931 | 0.3727 | 0.4390 | 0.5470 | 0.6135 |
| 0.3067 | 0.3908 | 0.4610 | 0.5769 | 0.6469 |
| 0.9646 | 0.9745 | 0.9801 | 0.9838 | 0.9860 |
| 0.2464 | 0.3278 | 0.4016 | 0.5134 | 0.5884 |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

1 1 1 1 1

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.2931  | 0.3727  | 0.4390  | 0.5470  | 0.6135  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

**297 351 410 505 593**

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.3067  | 0.3908  | 0.4610  | 0.5769  | 0.6469  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |
| 1.0000  | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

**122 215 302 375 400**

|            |            |            |            |            |
|------------|------------|------------|------------|------------|
| 1          | 1          | 1          | 1          | 1          |
| 0.9646     | 0.9745     | 0.9801     | 0.9838     | 0.9860     |
| -0.6271    | -0.9360    | -0.9878    | -0.7716    | -0.3573    |
| -0.7789    | -0.3521    | 0.1556     | 0.6361     | 0.9340     |
| 0.9769     | 0.6591     | -0.3074    | -0.9816    | -0.6674    |
| 0.2135     | -0.7521    | -0.9516    | -0.1908    | 0.7447     |
| 1.0000     | 1.0000     | 1.0000     | 1.0000     | 1.0000     |
| <b>649</b> | <b>722</b> | <b>774</b> | <b>753</b> | <b>685</b> |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.2464  | 0.3278  | 0.4016  | 0.5134  | 0.5884  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

|            |            |            |            |            |
|------------|------------|------------|------------|------------|
| <b>300</b> | <b>409</b> | <b>480</b> | <b>505</b> | <b>536</b> |
|------------|------------|------------|------------|------------|

|     |     |     |     |     |
|-----|-----|-----|-----|-----|
| 211 | 312 | 391 | 440 | 468 |
|-----|-----|-----|-----|-----|

|       |      |      |       |       |
|-------|------|------|-------|-------|
| 401   | 379  | 345  | 248   | 195   |
| 430   | 354  | 314  | 251   | 224   |
| -0.07 | 0.07 | 0.10 | -0.01 | -0.13 |
| -0.07 | 0.07 | 0.09 | -0.01 | -0.14 |

A72

| Chronic TVS at A72 |         |        | Prediction Equation Coefficients |          |          |         |
|--------------------|---------|--------|----------------------------------|----------|----------|---------|
|                    | a2      | b2     |                                  | Hardness | Aluminum | Cadmium |
| Cd                 | -3.49   | 0.7852 | B                                | 0.006    | 1.000    | 0.006   |
| Cu                 | -1.7428 | 0.8545 | Intercept                        | 82.304   | -26.540  | 1.020   |
| Mn                 | 5.8743  | 0.3331 | BQ                               | 200.676  | 5610.562 | 1.466   |
| Zn                 | 0.8669  | 0.8473 | sin                              | 16.936   | 158.116  | 0.599   |
|                    |         |        | cos                              | 48.860   | 40.749   | 0.066   |
|                    |         |        | sin1                             | 15.385   | 127.998  | -0.265  |
|                    |         |        | cos1                             | -5.633   | 6.691    | -0.292  |
|                    |         |        | Consent                          |          |          |         |
| Month              | J       | F      | M                                | A        | M        | J       |
| Q                  | 64      | 63     | 77                               | 155      | 682      | 1196    |
| Hardness           | 277     | 290    | 268                              | 196      | 91       | 53      |
| Al ch              | 87      | 87     | 87                               | 87       | 87       | 87      |
| Cd ch              | 2.5     | 2.6    | 2.5                              | 1.9      | 1.1      | 0.7     |
| Cu ch              | 11      | 11     | 10                               | 8        | 4        | 3       |
| Mn ch              | 2317    | 2352   | 2290                             | 2064     | 1598     | 1333    |
| Zn ch              | 279     | 290    | 271                              | 208      | 109      | 68      |
|                    |         |        |                                  |          |          | 90      |

M 34

| Prediction equation coefficients |           |            |          |           |           |           |     |
|----------------------------------|-----------|------------|----------|-----------|-----------|-----------|-----|
|                                  | Hardness  | Aluminum   | Cadmium  | Copper    | Iron      | Zinc      |     |
| B                                | 0.013     | 1.00       | 0.021    | 0.123     | 0.06521   | 0.021     |     |
| Intercept                        | 60.05228  | 15.10361   | 0.91724  | 14.65129  | 77.70523  | 05.25873  |     |
| BQ                               | 205.02801 | 38.29032   | 0.60966  | 00.98354  | 70.29706  | 78.11589  |     |
| sin                              | 9.24827   | 69.03843   | 0.26911  | 14.16661  | -89.38888 | 88.77920  |     |
| cos                              | 32.30173  | 79.08681   | 0.20991  | 10.17487  | 38.04002  | 85.94018  |     |
| sin1                             |           | 435.43127  | -0.12214 | 1.04278   | 86.24646  | -17.99615 |     |
| cos1                             |           | 123.10453  | -0.14689 | -3.82920  | -12.30367 | -45.60154 |     |
| consent                          |           | -265.10754 |          | -10.75402 | 35.80515  | -98.00378 |     |
| MONTH                            | J         | F          | M        | A         | M         | J         | J   |
| Avg monthly                      | Q         | 22         | 22       | 28        | 58        | 266       | 468 |
|                                  | Hardness  | 255        | 241      | 226       | 170       | 86        | 60  |
| Chronic Stan                     | Al, ch    | 87         | 87       | 87        | 87        | 87        | 87  |
|                                  | Cd, ch    | 2.4        | 2.3      | 2.1       | 1.7       | 1.0       | 0.8 |
|                                  | Cu ch     | 20         | 19       | 18        | 14        | 8         | 6   |

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| Mn    | 2253 | 2212 | 2163 | 1969 | 1571 | 1389 | 1504 |
| Zn ch | 260  | 248  | 235  | 185  | 104  | 76   | 93   |

### A68 Animas at Silverton

#### Prediction equation coefficients

Hardness Cadmium Copper Manganese Zinc

|           |         |        |        |          |          |
|-----------|---------|--------|--------|----------|----------|
| B         | 0.011   | na     | na     | 0.010    | 0.016    |
| Intercept | 37.945  | 2.395  | 5.783  | 258.473  | 304.617  |
| BQ        | 165.600 |        |        | 1371.923 | 644.136  |
| sin       |         | 1.712  | 2.049  | 611.024  | 315.451  |
| cos       |         | 0.140  | 0.729  | 81.662   | -18.603  |
| sin1      |         | -0.250 | -1.520 | 16.031   | -33.783  |
| cos1      |         | -1.185 | -0.472 | -263.628 | -140.108 |
| May       |         | -1.936 | 2.261  | -258.699 |          |
| consent   |         | -0.714 | -1.828 | 411.428  | -67.174  |

| Animas R   | Month    | J    | F    | M    | A    | M    | J    | J    |
|------------|----------|------|------|------|------|------|------|------|
|            |          | Q    | 25   | 25   | 31   | 66   | 329  | 585  |
|            | Hardness | 168  | 168  | 161  | 134  | 74   | 60   | 76   |
|            | Cd,tvs   | 1.7  | 1.7  | 1.7  | 1.4  | 0.9  | 0.8  | 0.9  |
|            | Cu tvs   | 14   | 14   | 13   | 11   | 7    | 6    | 7    |
|            | Mn tvs   | 1959 | 1961 | 1934 | 1818 | 1491 | 1393 | 1509 |
| onic stand | Zn tvs   | 182  | 183  | 177  | 151  | 91   | 77   | 94   |

ction Equation Coefficients

| Copper  | Iron     | Zinc    |
|---------|----------|---------|
| 0.100   | 0.048    | 0.014   |
| 11.592  | 325.430  | 272.266 |
| -11.516 | 6156.248 | 697.432 |
| 5.618   | 310.323  | 155.229 |
| 5.955   | 262.025  | 37.490  |
| 1.700   | -72.066  | -37.359 |
| -0.594  | -177.065 | -77.421 |
| -1.491  |          |         |

| A    | S    | O    | N    | D    |
|------|------|------|------|------|
| 268  | 187  | 142  | 92   | 70   |
| 124  | 158  | 182  | 215  | 248  |
| 87   | 87   | 87   | 87   | 87   |
| 1.3  | 1.6  | 1.8  | 2.1  | 2.3  |
| 5    | 7    | 7    | 9    | 10   |
| 1772 | 1920 | 2013 | 2129 | 2233 |
| 141  | 173  | 195  | 225  | 255  |

Acute TVS at M34 Chronic TVS at M34

|    | a2      | b2     | a3      | b3     |
|----|---------|--------|---------|--------|
| Cd | -3.828  | 1.128  | -3.49   | 0.7852 |
| Cu | -0.7703 | 0.9422 | -1.7428 | 0.8545 |
| Mn | 4.4995  | 0.7893 | 5.8743  | 0.3331 |
| Zn | 0.8904  | 0.8473 | 0.8669  | 0.8473 |

| A   | S   | O   | N   | D   |
|-----|-----|-----|-----|-----|
| 103 | 71  | 53  | 33  | 25  |
| 126 | 151 | 192 | 217 | 253 |
| 87  | 87  | 87  | 87  | 87  |
| 1.4 | 1.6 | 1.9 | 2.1 | 2.3 |
| 11  | 13  | 16  | 17  | 20  |

|      |      |      |      |      |
|------|------|------|------|------|
| 1783 | 1892 | 2050 | 2136 | 2246 |
| 144  | 167  | 205  | 227  | 258  |

Chronic TVS at A68

a2 b2

|    |         |        |
|----|---------|--------|
| Cd | -3.49   | 0.7852 |
| Cu | -1.7428 | 0.8545 |
| Mn | 5.8743  | 0.3331 |
| Zn | 0.8669  | 0.8473 |

| A    | S    | O    | N    | D    |
|------|------|------|------|------|
| 122  | 82   | 60   | 38   | 28   |
| 109  | 125  | 138  | 155  | 165  |
| 1.2  | 1.4  | 1.5  | 1.6  | 1.7  |
| 10   | 11   | 12   | 13   | 14   |
| 1695 | 1777 | 1836 | 1908 | 1947 |
| 126  | 142  | 155  | 171  | 180  |